National Institute of Environmental Health Sciences

Sustainable control of water-related infectious diseases: A review and proposal for interdisciplinary health-based systems research

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Abstract:

Objective: Even when initially successful, many interventions aimed at reducing the toll of water-related infectious disease have not been sustainable over longer periods of time. Here we review historical practices in water-related infectious disease research and propose an interdisciplinary public health oriented systems approach to research and intervention design. Data sources: On the basis of the literature and the authors' experiences, we summarize contributions from key disciplines and identify common problems and trends. Practices in developing countries, where the disease burden is the most severe, are emphasized. Data extraction: We define waterborne and water-associated vectorborne diseases and identify disciplinary themes and conceptual needs by drawing from ecologic, anthropologic, engineering, political/economic, and public health fields. A case study examines one of the classes of water-related infectious disease. Data synthesis: The limited success in designing sustainable interventions is attributable to factors that include the complexity and interactions among the social, ecologic, engineering, political/economic, and public health domains; incomplete data; a lack of relevant indicators; and most important, an inadequate understanding of the proximal and distal factors that cause water-related infectious disease. Fundamental change is needed for research on water-related infectious diseases, and we advocate a systems approach framework using an ongoing evidence-based health outcomes focus with an extended time horizon. The examples and case study in the review show many opportunities for interdisciplinary collaborations, data fusion techniques, and other advances. Conclusions: The proposed framework will facilitate research by addressing the complexity and divergent scales of problems and by engaging scientists in the disciplines needed to tackle these difficult problems. Such research can enhance the prevention and control of water-related infectious diseases in a manner that is sustainable and focused on public health outcomes.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2717125

Resource Description

Communication: ☑

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience: ☑

audience to whom the resource is directed

Researcher

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Extreme Weather Event, Food/Water Quality, Food/Water Security, Food/Water Security, Human Conflict/Displacement

Extreme Weather Event: Drought, Flooding

Food/Water Quality: Pathogen

Food/Water Security: Agricultural Productivity

Geographic Feature: ☑

resource focuses on specific type of geography

General Geographical Feature

Geographic Location: ☑

resource focuses on specific location

Global or Unspecified

Health Co-Benefit/Co–Harm (Adaption/Mitigation): ☑

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease, Morbidity/Mortality

Infectious Disease: Foodborne/Waterborne Disease, General Infectious Disease, Vectorborne Disease

Foodborne/Waterborne Disease: Campylobacteriosis, Cholera, Cryptosporidiosis, E. coli, Schistosomiasis, Other Diarrheal Disease

Vectorborne Disease: Fly-borne Disease, General Vectorborne, Mosquito-borne Disease

Fly-borne Disease: General Fly-borne Disease

Mosquito-borne Disease: Dengue, General Mosquito-borne Disease, Malaria

Intervention: ☑

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Medical Community Engagement: ☑

resource focus on how the medical community discusses or acts to address health impacts of climate change

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Methodology

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type:

format or standard characteristic of resource

Policy/Opinion, Research Article, Review

Resilience:

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Time Scale Unspecified